

# WELL BLASTING

Brought to you by

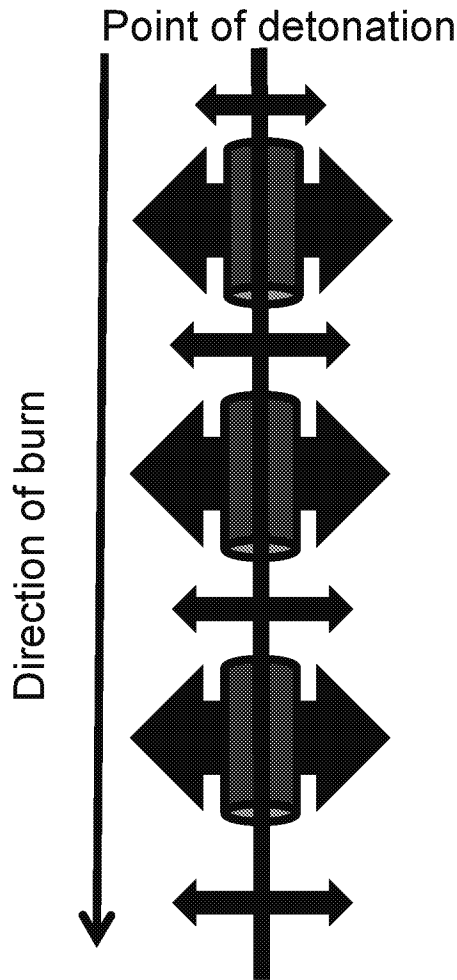


**Welenco**<sup>TM</sup>  
water well technology

# Blast Perforation Goals

- ❑ Protect against any potential threat to groundwater quality
- ❑ Completely fill the well and any porous areas around the well
- ❑ Efficiency. Blasting is faster than over drilling

# How Casing Blasting Works

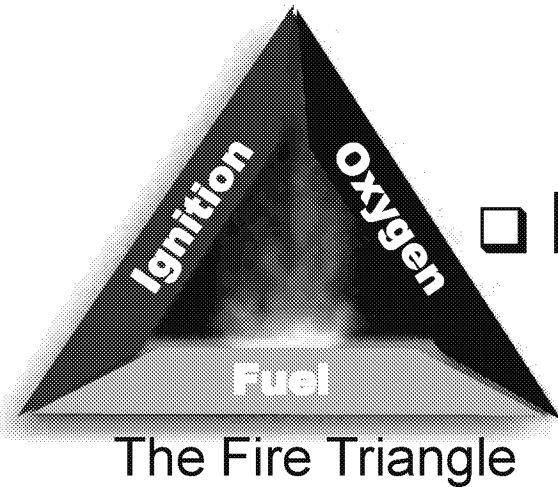


- ❑ Pressure is pushed out in all directions starting at the point of initiation
- ❑ The sealing material weight and burn direction confines the blast to down the well
- ❑ Pressure breaks the casing and the weight and height of the sealing material above forces it down and out which fills any space below

# What Are Explosives



# Explosives are a Fuel that Burns



## Normal Burning

□ Fuel + oxygen + ignition = burning

## Explosives Burn Differently They Create Their Own Oxygen



□ Fuel + Ignition = Oxidation

The Explosive  
Equation

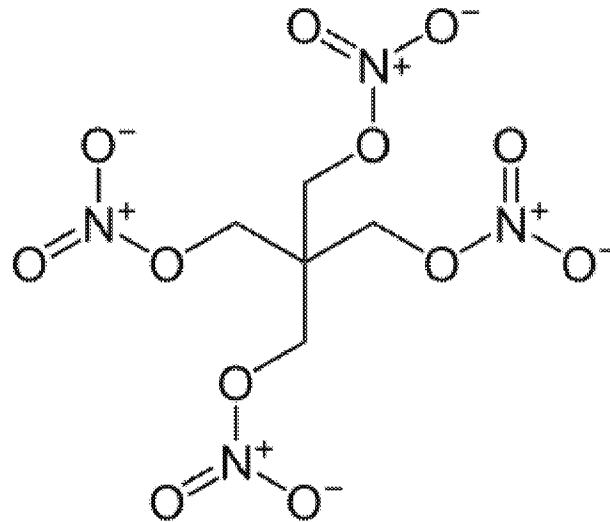
□ Rapid Oxidation = Detonation

# Visualizing How This Works

- Take something the size of a dime
- Instantly inflate it to the size of an elephant



# P-E-T-N



- Pentaerythritol Tetranitrate is an odorless white crystalline solid. Has a relative effectiveness factor of 1.66 and a confined detonation velocity between 23,000 and 25,000 fps.

# Detonating Cord

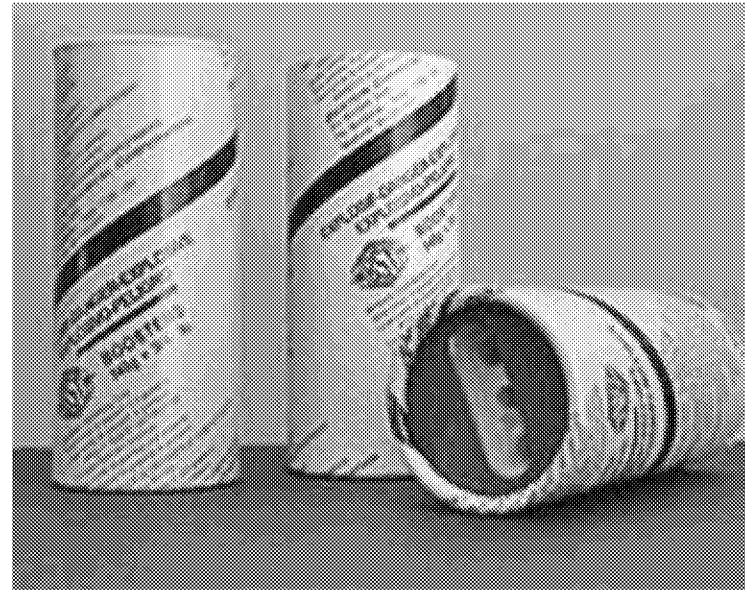
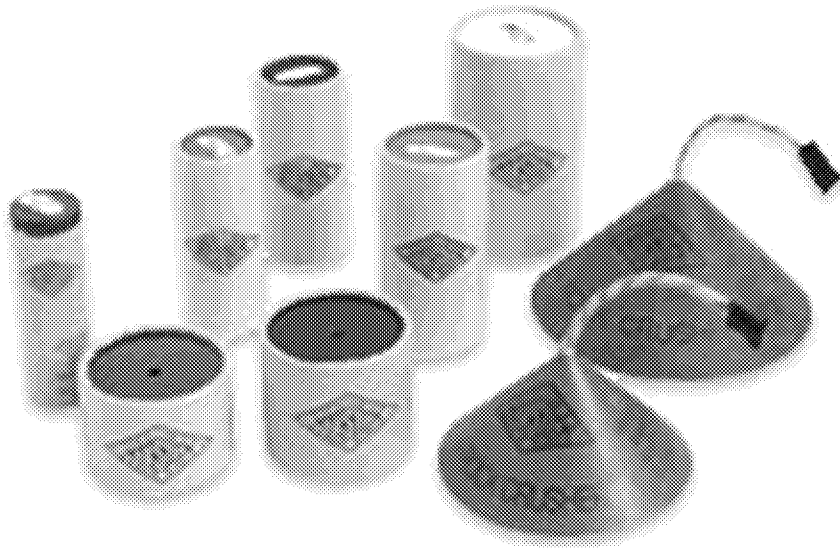




# Detonating Cord

- Think of it as an explosive rope
- The core of this rope is 100% PETN
- Burns at 23,000 feet per second
- This cord comes in different strengths and is measured in grains per foot

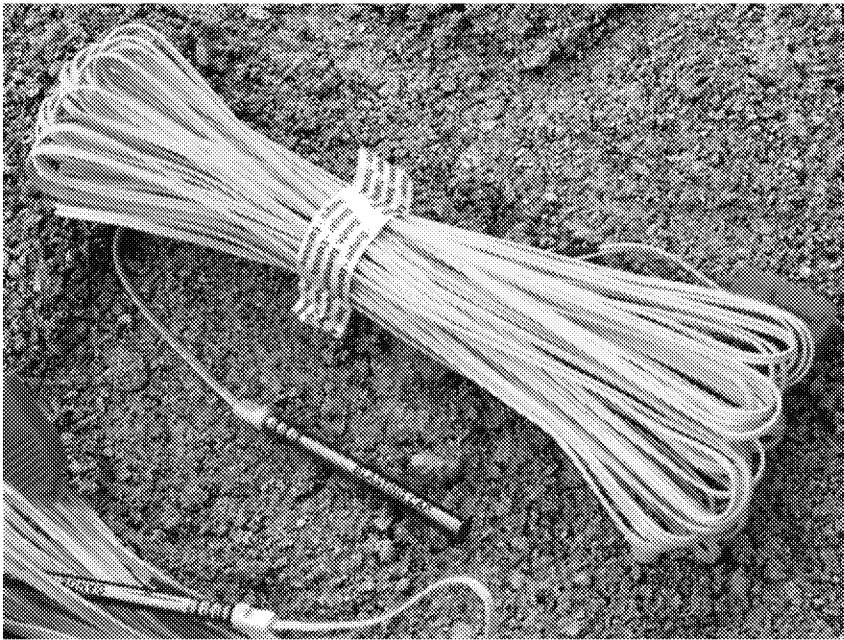
# Cast Boosters



# Cast Boosters

- Also made of PETN
- Cast Boosters are not for every job.
- Release 235 Kbar of pressure or 3.5 million PSI upon detonation
- Used for large diameter steel cased wells

# Blasting Caps



Electric

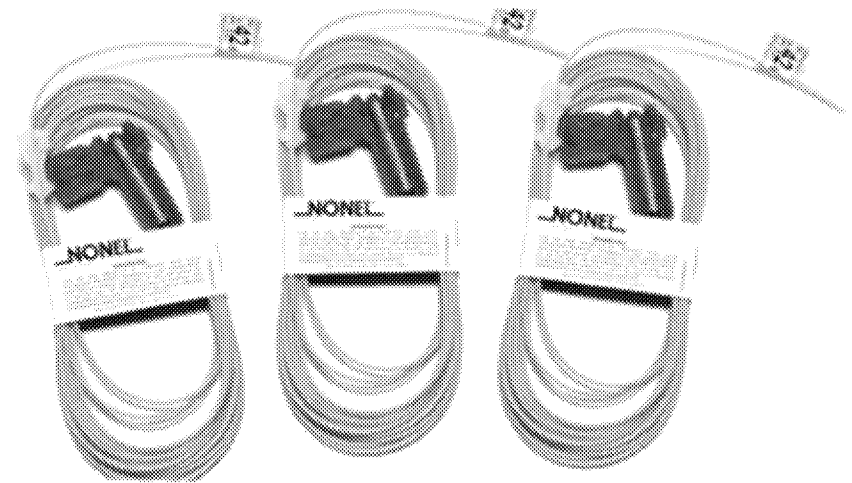


Non-Electric

# Blasting Caps

- Electric and NONEL or non electric type
- Sometimes referred to as starters or initiators
- Also PETN
- Only NONEL is used in water well destruction

# NONEL Lead Line



# Lead Line

- Think of it like a fuse
- Comes in spools
- Burns at 6500 feet per second
- Does not detonate

# Blasting Machines

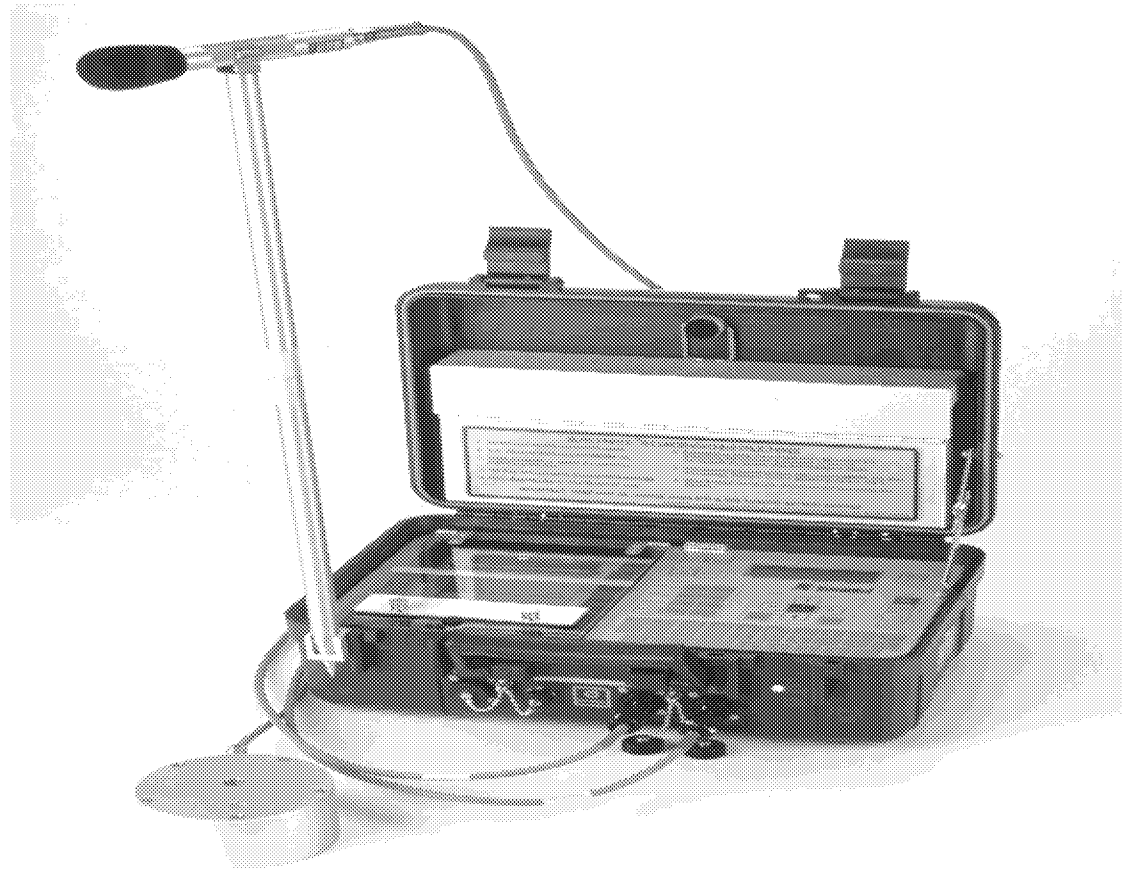




# Blasting Machines

- Used to trigger a Blasting Cap using either electrical shock or mechanical firing of a primer
- Mechanical – NONEL, fires a 209 primer to initiate trunk line
- Electrical – Sends electrical charge to the cap using wires

# Seismograph



# Seismograph

- Portable seismic action recorder designed specifically for blasting operations
- Onsite and in field recording and printing
- Tri-axial Geophone for ground readings
- Microphone for Airburst readings
  - Airburst is the sonic boom created by surface blasts
- Instantel Blastware software analysis

# Storage



# Magazine



Large  
Storage  
Container

ATF  
Registered  
Location

Secured  
Immobile  
Structure

# Day Box



Small  
storage  
container

Rated for  
daily  
activities

Can be  
vehicle  
mounted

# Licenses And Permits Required For Water Well Blasting

## ■ To do the work

- BATF Issued FEL License (Federal Explosive License)
- Department of Justice (DOJ) Certificate of Eligibility
  - Background check and certification for firearms sales
- Cal-OSHA Blasting License For Water Well Services
  - Blasting license have classification and limitations listed on them
- CA C-57 Contractors License
  - \*C-61 D-09 Drilling, Blasting And Oil Field License does not apply for water wells.
- Explosive Permit for the county in which the work is to be done
  - Issued by Sheriff's Office or Fire Department



# Things To Consider For Proper Blast Perforation

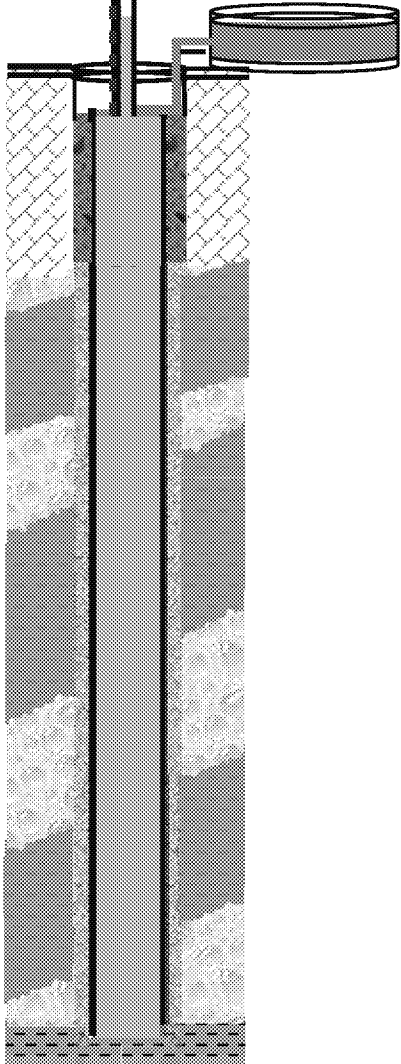
## ☐ Inside (the hole)

- ☐ Casing
- ☐ Perforations
- ☐ Open hole

## ☐ Outside

- ☐ Seals
- ☐ Gravel pack
- ☐ Formations
- ☐ Voids and space behind casing

# Loading The Hole



- Lower charges and trimmie pipe into well

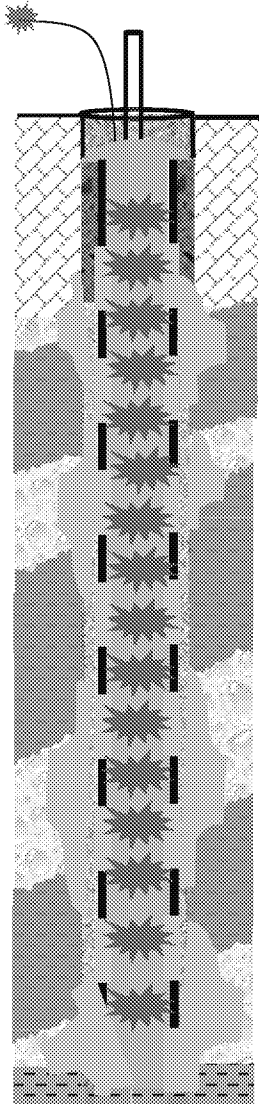
Note: If pvc pipe is used it can be left in well and destroyed with the well

If steel pipe is used it is pulled out before blasting

- Fill well with sealing material

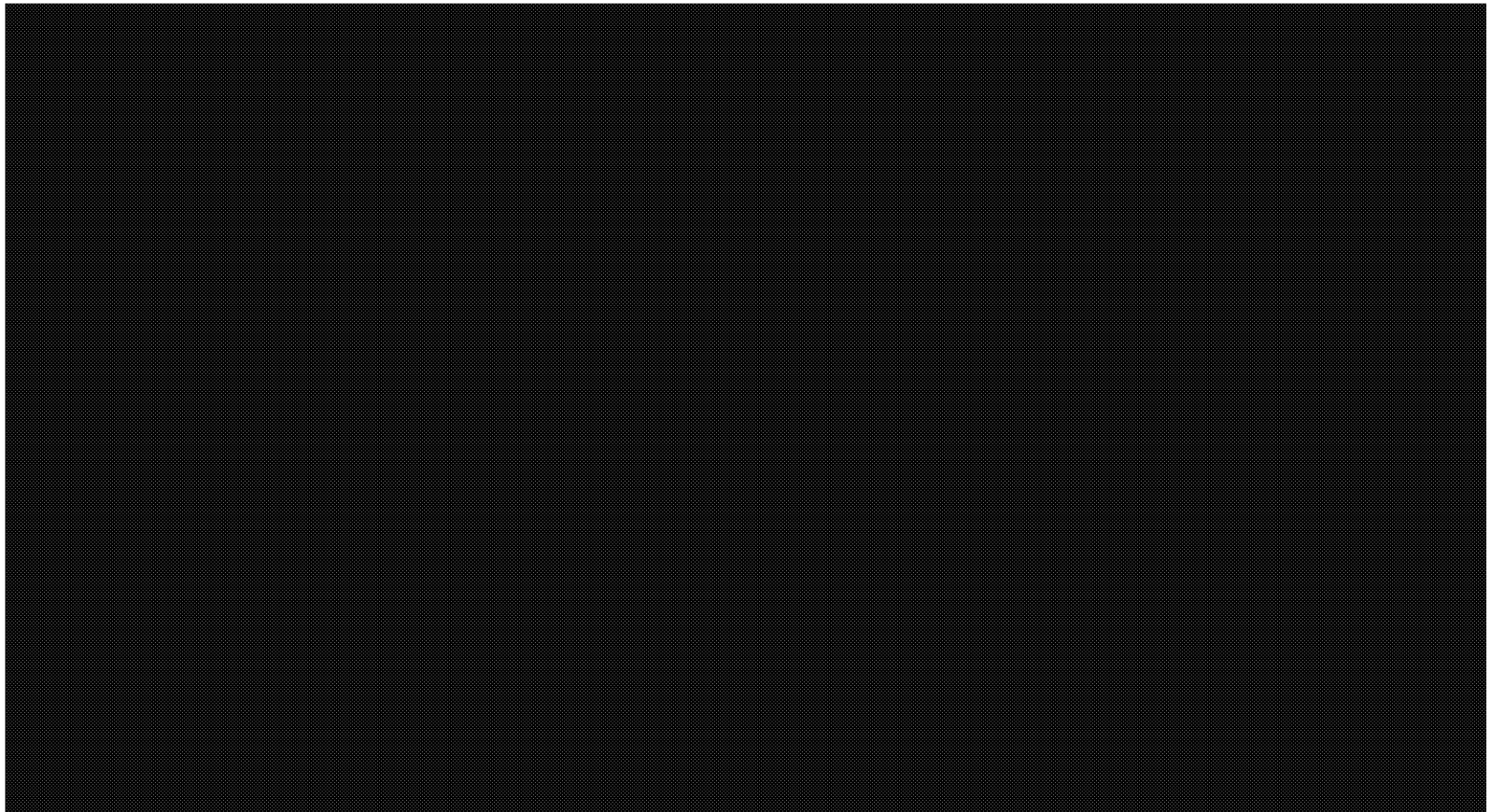
Cement sand mix, neat cement, or a bentonite slurry can be used, however each material provides a different stemming action and perforation is affected

# Destroying The Well



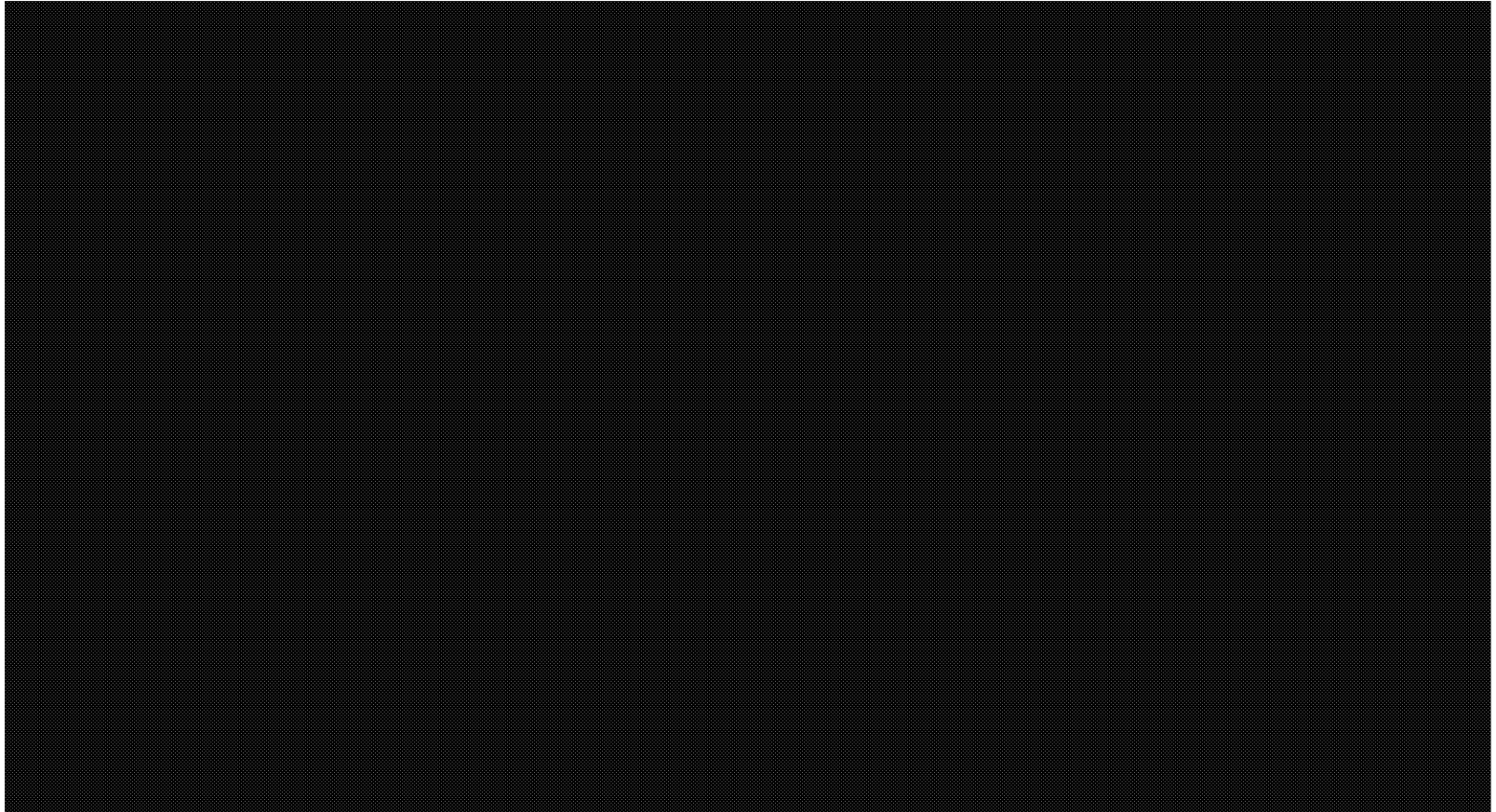
- Detonate the charge
- Refill any drop in sealing material and form a mushroom cap over the casing
- Back fill to grade

# Onsite Video LADWP Headworks Project



# Onsite Video

## LADWP Headworks Project



# Onsite Video First Solar Mojave Project



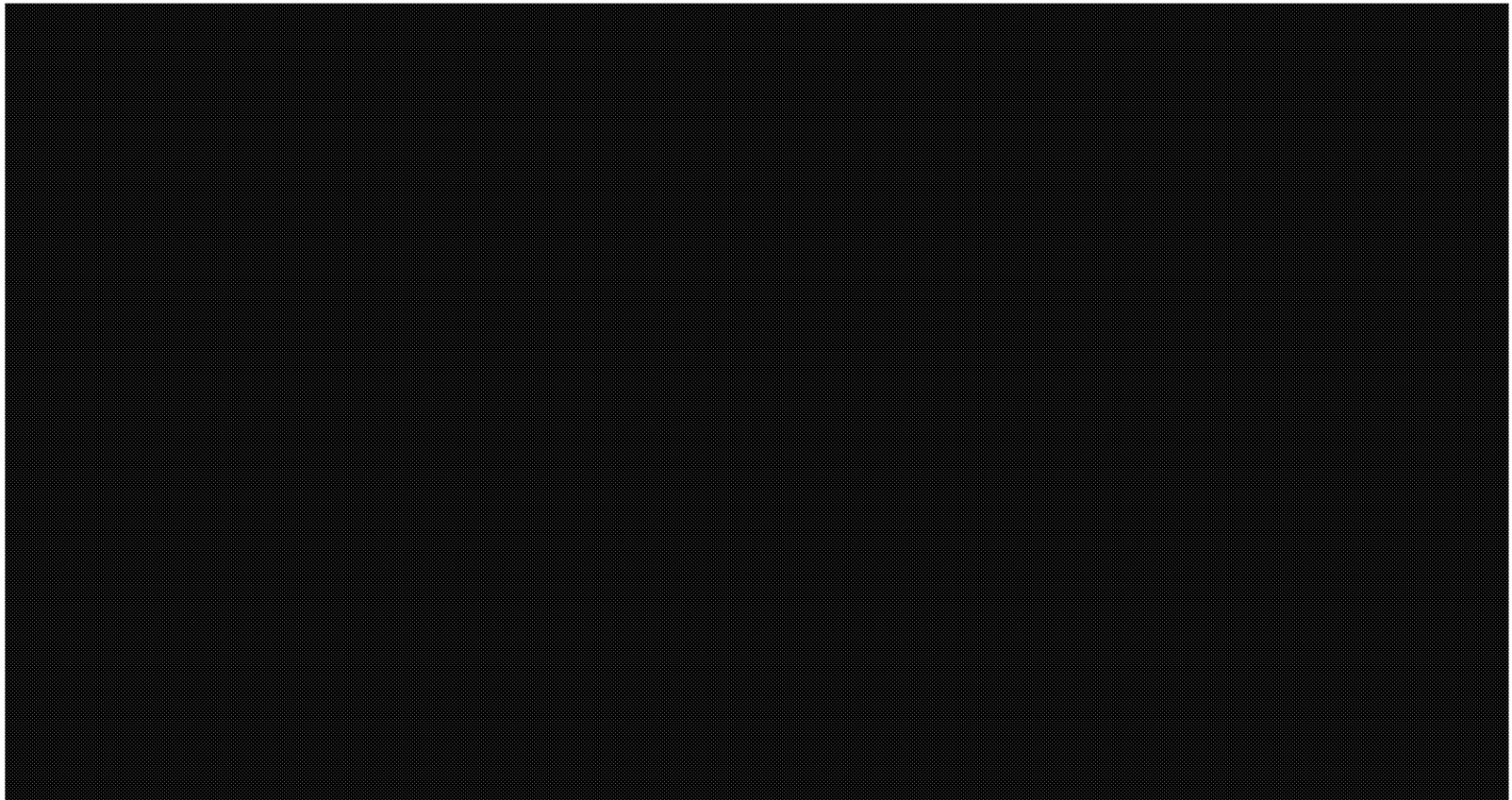
# Onsite Video

## First Solar Mojave Project



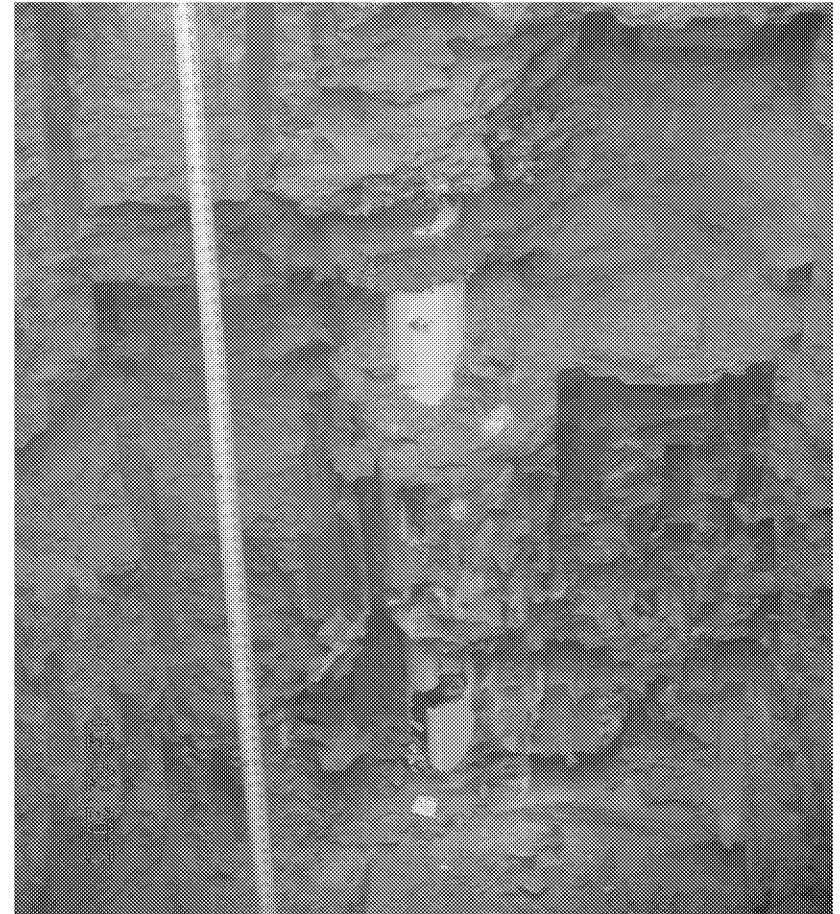
# Onsite Video

## Chevron Site 309075





# Casing After Blasting



# 2012 -2014 Welenco Well Abandonment Activities

- ☐ Sacramento County: 76 wells abandoned
- ☐ Contra Costa County: 110 wells abandoned
- ☐ Sonoma County: 43 wells abandoned
- ☐ Los Angeles County: 45 wells abandoned
- ☐ Napa County: 52 wells abandoned
- ☐ San Joaquin County: 115 wells abandoned
- ☐ Kern County: 32 wells abandoned
- ☐ Alameda County: 27 wells abandoned
- ☐ San Diego County: 3 wells abandoned
- ☐ Santa Clara County: 14 wells abandoned
- ☐ Orange County: 10 wells abandoned

# 2012 – 2014 Welenco Industry Advocacy Activities

- Facilitated seminar at Groundwater Resources Association – invited by Sacramento County Environmental Health Department
  
- One-on-one review and awareness discussions with Agencies – client requests

# Summarizing

## Blasting In Well Destruction

- ❑ Blasting saves time / Blasting takes minutes; mechanical perforating or over drilling can take days
- ❑ The sealing and perforating can be done in one operation
- ❑ Blasting works in any type of well, even double or triple cased wells
- ❑ Blasting insures proper sealing for both contamination problems and physical hazard
- ❑ Blasting makes the job easier

# ***Now It Is Time For Questions***



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